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SUBJECT: EVALUATION OF IRIS II TEST 001, FLOWN 22 NOVEMBER 1969

A. BACKGROUND: AN IRIS II TEST WAS FLOWN ON 22 NOVEMBER 1969 EMPLOYING UNIT NO. 8011 WITH THE AUTOMATIC EXPOSURE CONTROL (AEC) ACTIVATED. THE PURPOSE OF THIS TEST WAS TO DETERMINE THE EFFECTS OF SOLAR ELEVATION, STABLIIZATION TIME AND LAND/WATER CONTRAST VARIATIONS ON IMAGE QUALITY AND EXPOSURE.

B. EVALUATION:

1. EXPOSURE: THE EXPOSURE RANGES FROM SEVERELY UNDEREXPOSED IN THE BEGINNING OF THE MISSION TO SLIGHTLY UNDEREXPOSED AT THE END OF THE MISSION. THE EXPOSURE ON THE LAST TWO THIRDS OF THE MISSION (SOLAR ELEVATIONS 28 - 42 DEGREES), WHILE SLIGHTLY UNDER-EXPOSED, IS SUITABLE FOR EXPLOITATION PURPOSES. HOWEVER, SOME SHADOW DETAIL WAS LOST DUE TO THE UNDEREXPOSURE. THERE WAS NO CHANGE IN EXPOSURE AS A RESULT OF THE LAND/WATER CONTRAST VARIATION.

2. IMAGE QUALITY VS STABILIZATION TIME: THE UNDEREXPOSURE THAT PREVAILED DURING THE FIRST 30 MINUTES OF THE FLIGHT PRECLUDES ANY DETERMINATION OF IMAGE DEGRADATION IN ASSOCIATION WITH STABLIZATION TIME. HOWEVER, AFTER 30 MINUTES OF FLIGHT THE IMAGERY DOES NOT APPEAR TO BE DEGRADED AS A RESULT OF INSUFFICIENT STABILIZATION TIME. THAT IS, EXCEPT FOR AN OBVIOUS EXPOSURE DIFFERENCE, THE IMAGERY ACQUIRED APPROXIMATELY 30 MINUTES AFTER TAKE-OFF IS COMPARABLE TO IMAGERY ACQUIRED AT THE END OF THE MISSION (T/O PLUS 3 HOURS).

3. PRINTING AND PROCESSING: PROCESSING OF THE ORIGINAL NEGATIVE IS SATISFACTORY. THE ORIGINAL NEGATIVE WAS PROCESSED TO AN AVERAGE GAMMA OF 1.65. THE DUPLICATE POSITIVE IMAGERY IS OF LOW CONTRAST WHICH APPEARS TO BE THE RESULT OF THE UNDEREXPOSED ORIGINAL NEGATIVE. THE BORDER AREAS OF THE POSITIVE RANGE IN DENSITY FROM 0.66 TO 0.91. THE AVERAGE DELTA DENSITY OF THE POSITIVES (16 SAMPLES) IS 0.55.

C. CONCLUSIONS:

1. EXPOSURE: BASED ON THE DRASTIC CHANGE IN EXPOSURE DURING THE MISSION, IT APPEARS THAT THE AEC IS NOT FUNCTIONING PROPERLY: I.E. IF THE AEC WERE OPERATING SATISFACTORILY, THE EXPOSURE SHOULD BE UNIFORM THROUGHOUT THE MISSION. THE SENSOR IS EITHER NOT WORKING OR IS NOT PROPERLY CALIBRATED. AS A RESULT, CONCLUSIONS AS TO THE EFFECTS OF SOLAR ELEVATION AND LAND/WATER EXPOSURE VARIATION CANNOT BE MADE.

2. IMAGE QUALITY: DUE TO THE SEVERE UNDEREXPOSURE AT THE BEGINNING OF THE MISSION, CONCLUSIONS AS TO THE AFFECTS OF STABILIZATION TIME ON IMAGE QUALITY COULD NOT BE ACCURATELY ESTAB-LISHED.

3. PRINTING AND PROCESSING: ALTHOUGH THE CONTRAST OF THE POSITIVES IS QUITE LOW, THE INTERPRETERS EXPERIENCED NO PROBLEMS IN READING-OUT THE LAST PORTION OF THE MISSION (WHICH WAS THE CLOSEST TO BEING PROPERLY EXPOSED). HOWEVER, THEY DID COMMENT THAT DETAIL IN THE SHADOW AREAS WAS DIFFICULT TO DETECT.

D. RECOMMENDATIONS:

1. THE AEC SHOULD NOT BE EMPLOYED ON OPERATIONAL MISSIONS UNTIL THE PROBLEM AREAS HAVE BEEN DEFINED AND APPROPRIATE ACTION TAKEN.

2. THE STABILIZATION TIME OF 2 HOURS SHOULD BE CONTINUED UNTIL FURTHER ANALYSIS CAN BE CONDUCTED ON MATERIAL THAT IS NOT AFFECTED BY EXPOSURE.

3. NRTSC SHOULD PROCESS ALL FUTURE MISSION MATERIAL WITH THE RESULTS BEING EVALUATED TO DETERMINE IF A SUITABLE CHEMISTRY/ FILM COMBINATION (BOTH ORIGINAL AND DUPLICATE) WAS EMPLOYED.

4. THE PROPOSED OPERATIONAL "TEST" TO BE FLOWN AT A PENE-TRATION SOLAR ELEVATION OF 20 DEGREES SHOULD BE DELAYED UNTIL THE RESULTS OF THE NEW PROCESSING CHEMISTRY CAN BE EVALUATED FURTHER.

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--END SECRET MESSAGE--

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